

**REMARKS****Summary of the Office Action**

In the Office Action, claims 16-22 stand rejected under 35 U.S.C. § 103 (a) as being unpatentable over GB 2,313,391 to *Swearingen* in view of U.S. Patent No. 5,595,247 to *Braddick*.

**Summary of the Response to the Office Action**

Applicant proposes amending claim 16 to further clarify the language thereof. Accordingly, claims 16-22 are pending for further consideration.

**All Claims are Allowable**

In the Office Action, claims 16-22 stand rejected under 35 U.S.C. § 103 (a) as being unpatentable over GB 2,313,391 to *Swearingen* in view of U.S. Patent No. 5,595,247 to *Braddick*. Applicant traverses this rejection for the following reasons.

With regard to independent claim 16, Applicant respectfully asserts that *Swearingen* and *Braddick*, whether viewed singly or in combination, do not teach or suggest a whipstock casing milling system including at least, “milling blades of the window mill being directly engaged with and deflected by the first ramp surface laterally into the casing as the window mill is rotated and forced along the first ramp surface toward the second ramp or parallel surface; and a protrusion provided on the whipface, the protrusion forming an extension of the first ramp surface of the whipface and being directly engaged by said milling blades as said milling blades travel along said first ramp surface onto said extension so as to reduce damage to the first ramp surface at the juncture of the first ramp surface and the second ramp or parallel surface during use of the system, the first ramp surface and the extension together forming a mill deflecting slope,” and “wherein the length of the extension being such that, in use, the surface area of the milling blades directly engaging said first ramp surface section of said mill deflecting slope reduces as a consequence of the mill moving along and projecting beyond said first ramp surface section of said mill deflecting slope, an increase in stress in said first ramp surface section of said mill deflecting slope due to said reduction in surface area being maintainable below a level which would cause damage to said first ramp surface section of said mill deflecting slope until the mill

has moved beyond the relatively steep first ramp surface and is no longer in engagement therewith,” as recited in independent claim 16, as amended.

Support for these features recited in independent claim 16 can be found at least on pages 3-6 of the originally filed specification, and in Figs. 5-8 of the originally filed drawings. Specifically, as shown in Figs. 5-8, the present invention provides a whipstock casing milling system including whipstock 44 having a whipface. As shown in Fig. 5, the whipface includes a first ramp surface 45 and a second ramp surface or parallel surface 46 meeting the first ramp surface at a juncture. A window mill 32 is secured to the whipstock adjacent the first ramp surface and operable in use to form an opening in a wellbore casing. Window mill 32 includes milling blades which directly engage with and are deflected by first ramp surface 45 laterally into the casing as the window mill is rotated and forced along the first ramp surface toward the second ramp. As shown in Figs. 5-8, a protrusion B is provided on the whipface, thus forming an extension of first ramp surface 45 for direct engagement by the milling blades as the milling blades travel along first ramp surface 45 onto the extension so as to reduce damage to the first ramp surface at the juncture of the first ramp surface and the second ramp surface during use of the system. The continuous contact of the milling blades with ramp surface 45 and protrusion B allows for stress at ramp surface 45 to be maintained below a predetermined level so as to avoid damage to the first ramp surface section of the slope until the mill has moved beyond the relatively steep ramp surface and is no longer in engagement therewith.

The Office Action cites *Swearingen* and *Braddick* as teaching or suggesting the whipstock casing milling system recited in independent claim 16.

As correctly acknowledged in the Office Action, *Swearingen* discloses a conventional whipstock accelerator ramp, but fails to disclose a protrusion extending from the first ramp. The Office Action then states that *Braddick* teaches a protrusion that is an extension of the first ramp thus protecting the first ramp, and furthermore, indicates that as the protrusion is partially milled off during the milling operation, the protrusion thus reduces damage to the first ramp at the junction of the first and second ramps. In view of the teachings of *Swearingen* and *Braddick*, the Office Action concludes that claim 16 would be obvious under the teachings of *Swearingen* and *Braddick* since one of ordinary skill in the art would have been motivated to combine *Swearingen* and *Braddick* to obtain a means for reducing the stress on the whipstock, as taught

by *Braddick*. Applicant respectfully disagrees with the aforementioned conclusion based upon the express teachings of *Swearingen* and *Braddick*, and based upon claim 16 as amended herein.

Specifically, Applicant respectfully asserts that at the outset, the teachings of *Braddick* are inapplicable to the whipstock milling system of *Swearingen* in that the *Braddick* milling system operates under an entirely different principle as compared to the *Swearingen* milling system. In this regard, the whipstock milling system of the present invention is concerned with a system in which the surface area of the mill engaging the deflecting surface (i.e. first ramp surface 45) reduces as milling takes place. This feature is clearly positively recited in independent claim 16, in that “milling blades of the window mill being directly engaged with and deflected by the first ramp surface laterally into the casing as the window mill is rotated and forced along the first ramp surface toward the second ramp or parallel surface.” The lateral force which has to be supported by the whipstock progressively increases as the mill cuts deeper into the casing up to the moment of breakthrough (because the deeper the cut is, the larger the area over which cutting takes place). While the increase in force is, perhaps, not significant, the decreasing area over which the forces react means that the force per unit area increases progressively as cutting takes place. This feature has also been clearly positively recited in independent claim 16, in that “the surface area of the milling blades directly engaging said first ramp surface section of said mill deflecting slope reduces as a consequence of the mill moving along and projecting beyond said first ramp surface section of said mill deflecting slope.” The whipstock milling system of the present invention is therefore concerned with how to avoid destruction of the main whipstock face (i.e. first ramp surface 45) as a result of this increased force-per-unit-area loading. This destruction is avoided by the provision of protrusion B, as recited in independent claim 16, in that “a protrusion [is] provided on the whipface, the protrusion forming an extension of the first ramp surface of the whipface.”

Applicant respectfully asserts that as indicated above, the teachings of *Braddick* are inapplicable to the whipstock milling system of *Swearingen* since the *Braddick* system only works because of the provision of nose 258 which is provided on the window mill. Because of the provision of nose 258, the window mill cutter of *Braddick* does not come into contact with any part of the whipstock until it begins to cut into ramp extension 260 (see Fig. 9a). From the moment when the end of the mill begins to cut into the ramp extension (at some point between

Figs. 9 and 9a of *Braddick*) the area of the mill which is in contact with the whipstock in fact progressively increases until further milling is prevented by the trapping of the nose 258 (Fig. 9a). In contrast to the increasing area of contact between the mill and whipstock of *Braddick*, for the present invention, the area of contact between the mill and whipstock progressively decreases. Furthermore, in *Braddick* there never is any contact between the cutter and the steep portion of the whipstock outside of ramp extension 260. This is all possible because of the provision of nose 258, but this of course occurs at a price - the use of nose 258 for *Braddick* means that once the mill arrives at the Fig. 9a configuration with nose 258 wedged against the casing, the entire drillstring has to be pulled back out and changed to a different type of bit in order to continue drilling.

Accordingly, in contrast to the whipstock milling system of *Braddick*, the whipstock milling system of the present invention is concerned with a type of system (such as the system disclosed in *Swearingen*) in which the mill runs directly up the steep face of the whipstock as it is forced sideways into the casing by direct contact with the steep face of the whipstock. As discussed above, this feature is clearly positively recited in independent claim 16, in that "milling blades of the window mill being directly engaged with and deflected by the first ramp surface laterally into the casing as the window mill is rotated and forced along the first ramp surface toward the second ramp or parallel surface." This recitation is in direct contrast to the nose-guided system which is acknowledged as prior art in *Swearingen* (see Figs. 1 and 2 of *Swearingen*). *Swearingen* thus avoids the drawbacks associated with the nose-guided system, such as the system disclosed by *Braddick* (which requires the drillstring be pulled out as soon as the nose prevents further progress) by providing a nose-less system in which the mill actually runs against the ramp of the whipstock. However, as outlined in the present application, the nose-less system of *Swearingen* is also problematic in that it is susceptible to wear, as the area of contact between the bit and the steep section of the ramp reduces.

Applicant therefore respectfully asserts that to argue that ramp extension 260 of *Braddick* (which is there purely to guide nose 258 of *Braddick*) would be obvious to apply to the system of *Swearingen* as a means of avoiding excess wear as a result of stress concentration could only be based upon impermissible hindsight, since there is no wear concentration on the steep face of the

whipstock in *Braddick*, and indeed the cutter in fact never comes into contact with the main whipstock surface in the *Braddick* design as compared to the *Swearingen* system.

Applicant further respectfully asserts that if the *Braddick* design were modified by omitting the nose and relying on contact between the cutter and the whipface to force the cutter sideways into the casing, as is the case with *Swearingen*, ramp extension 260 would be totally ineffective at protecting the main ramp surface. This is because the cutter of *Braddick*, in the absence of the nose, would come into contact with the steep ramp surface well prior to the junction between the steep and the shallow surfaces. At this point, the *Braddick* cutter would be in near full face side contact with the casing but would be in line contact only with the opposite face of the whipstock. This would result in immediate and catastrophic damage to the steep face of the ramp and, in effect, the *Braddick* cutter would simply mill deep into the ramp in preference to being forced out sideways into the casing. As soon as a notch had been milled in the steep surface of the ramp face, there would no longer be any lateral force applied to the cutter in the direction of the casing and the cutter would simply run down milling away the whipstock rather than milling the casing.

Based at least upon the aforementioned differences in the structure as well as the operation of the whipstock casing milling system of the present invention versus the systems of *Swearingen* and *Braddick*, Applicant respectfully asserts that the milling system of the present invention is clearly patentable over the teachings of *Swearingen* and *Braddick*, in that *Swearingen* and *Braddick* clearly do not teach or suggest, a whipstock casing milling system including at least, “milling blades of the window mill being directly engaged with and deflected by the first ramp surface laterally into the casing as the window mill is rotated and forced along the first ramp surface toward the second ramp or parallel surface; and a protrusion provided on the whipface, the protrusion forming an extension of the first ramp surface of the whipface and being directly engaged by said milling blades as said milling blades travel along said first ramp surface onto said extension so as to reduce damage to the first ramp surface at the juncture of the first ramp surface and the second ramp or parallel surface during use of the system, the first ramp surface and the extension together forming a mill deflecting slope,” and “wherein the length of the extension being such that, in use, the surface area of the milling blades directly engaging said first ramp surface section of said mill deflecting slope reduces as a consequence of the mill

moving along and projecting beyond said first ramp surface section of said mill deflecting slope, an increase in stress in said first ramp surface section of said mill deflecting slope due to said reduction in surface area being maintainable below a level which would cause damage to said first ramp surface section of said mill deflecting slope until the mill has moved beyond the relatively steep first ramp surface and is no longer in engagement therewith,” as recited in independent claim 16, as amended.

As pointed out in MPEP § 2131, “[t]o anticipate a claim, the reference must teach every element of the claim.” “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.”

*Verdegaal Bros. v. Union Oil Co. Of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987).

Moreover, as pointed out in M.P.E.P. § 2143.03, “[t]o establish prima facie obviousness of a claimed invention, all the claimed limitations must be taught or suggested by the prior art”. *In re Royka*, 409 F.2d 981, 180 USPQ 580 (CCPA 1974). Since the above-identified criteria have not been met, Applicant respectfully asserts that the rejection under 35 U.S.C. § 103 (a) should be withdrawn because *Swearingen* and *Braddick* do not teach or suggest each feature of independent claim 16, as amended.

In view of the above arguments, Applicant respectfully requests the rejection of independent claim 16 under 35 U.S.C. § 103 be withdrawn. Additionally, claims 17-22, which depend from independent claim 16, are allowable at least because their base claim is allowable, as well as for the additional features recited therein.

### **CONCLUSION**

In view of the foregoing, Applicant respectfully requests reconsideration and the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of the response, the Examiner is invited to contact the Applicant’s undersigned representative to expedite prosecution.

If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 04-2223. If a fee is required for an extension of time under 37 C.F.R. §1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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